Synopsis of a Severe Post-Tournament Mortality on Largemouth Bass at Mattawoman Creek (Potomac River, MD), a Review of Possible Factors and the MDNR Response

Background

On 29 June, 2009, Joe Love (Tidal Bass Manager, Maryland Department of Natural Resources) received notice that several large, dead tidal bass were floating in Mattawoman Creek from Roger Trageser (President, Maryland Bass Federation Nation). On that day, Mary Groves (Southern Division Manager, MDDNR) and her staff surveyed Mattawoman Creek and counted approximately 130 dead tidal bass. Local anglers also reported several floating tidal bass, particularly near the docks at Smallwood State Park. On 30 June 2009, more black bass had either died overnight or floated inshore, and estimates of 1000 bass were made by John Wheeler and reported to Ken Penrod. On Wednesday, 1 July 2009, a team of four MDDNR staff biologists surveyed 5.2 miles of streamside habitat of Mattawoman Creek that included habitats from Trash Point to Marsh Island, as well as habitats surrounding the marina and boat docks of Smallwood State Park. The team counted 601 dead largemouth bass that were in different stages of decomposition. Most fish reflected the same stages of decomposition as those retained in a concurrent net-pen study, which housed fish obtained on 27 June 2009. Unlike fish protected by the net pen, fish in Mattawoman Creek showed signs of consumption by predators such as snapping turtles and birds of prey. Most fish were near the shoreline, with a few floating near the main channel of Mattawoman Creek. In addition to the dead largemouth bass, there were also 247 dead catfish (white catfish, blue catfish, brown bullhead), and a few other much less abundant species (gizzard shad, bluegill sunfish, goldfish).

The weekend prior to 29 June 2009 was characterized by 4 fishing tournaments and numerous recreational anglers on Mattawoman Creek. A total of 800 anglers fished from 25 June – 28 June 2009 and a total of 3407 fish were caught, the highest ever reported for a tournament at Smallwood State Park since 2005. These tournaments generated from 0 – 6 % instantaneous mortality levels. It is presumed that most of the observed mortality on 29 June 2009 was a result of delayed mortality of individuals following tournament activities. Water temperature during the tournament period was approximately 28° C (or 82.4° F), which was about 1 - 2° C higher than previous or following days.

On 29 June 2009, Ron Lappan (FLW director of the tournament) informed Joe Love that during the tournament, he observed no bloated fish and that the tournament held a water weigh-in, which minimized handling time. The release boat contained well-oxygenated and iced water. Canopies were used on the boat. Two release boats were used and two trips to Mattawoman Creek were conducted each day. While most tournaments were held at Smallwood State Park, the FLW Stren Series tournament held on 27 June 2009 was conducted on the Wal-Mart Parking lot. However, only 20 anglers fished for the FLW Stren Series on 27 June 2009.

Scientific Studies

Many studies have been conducted regarding the fate of tournament-caught largemouth and smallmouth bass, largely owed to their popularity in sport fishing for the United States. Wilde (1998) and Siepker (2007) provide comprehensive reviews of these studies. In short, recommendations (listed in order of priority) from relevant studies include:

1) conduct tournaments during periods when water temperatures do not exceed 25° C (Wilde 1998, Edwards et al. 2004, and others);
2) maintain water in live wells (both in release boat and on individual boats) at or near ambient water temperature (Suski et al. 2006);

3) reduce the number of procedural steps during a tournament weigh-in (Edwards et al. 2004);
4) minimize air exposure of the fish (Suski et al. 2004);
5) restrict the length of the day for the fishing tournament (Bennet et al. 1989), and hence the amount of time fish spend in the live well;
6) limit the number of fish in a live well to 1 to 3 (Cooke et al. 2002);
7) use aeration and not compressed oxygen to maintain dissolved oxygen levels (Suski et al. 2006).

While the level of initial mortalities are not related to the level of delayed mortalities (Wilde 1998), data of initial mortalities may be used for evaluating causes of mortality during the weigh-in procedure. Data collected by Maryland Department of Natural Resources on initial mortalities at Smallwood State Park (2005 – 2008) indicated that the initial mortality during tournaments increases with water temperature. The level of mortality also increases with the number of anglers, but this relationship was far less conclusive than that for temperature.

From Wilde (1998), the percentage of fatalities is expected to increase non-linearly with water temperature. For monthly water temperatures expected in Mattawoman Creek, mortalities will be highest between mid-June and mid-August. However, temperature was only one component of many that can explain why fish die during and following tournaments. In fact, estimates of delayed mortality can range from as low as 15% to nearly 70% at 77° F water temperature and depend on other factors. Some of these factors can include size and number of fish, the handling procedures of a tournament, the size of a tournament, length of day for a tournament, live well conditions, and other environmental considerations, such as dissolved oxygen and the condition of the water body to which the fish are released.

Current Management

The regulations for the State of Maryland limit number of bass per angler (a maximum of 5/angler), size limits, and recommend that tank conditions in release boats (or holding chambers following weigh-in procedures) yield no more than 1 bass/gallon (< 70° F) or 1 pound of bass per gallon (>70° F).

The State of Florida has outlined numerous recommendations for tournament anglers. These recommendations include:

1) the tournament director maintains a registration list for all participants;
2) each boat has one or more functioning aerated live wells;
3) all bass transported from boats to the weigh-in site must be transported in a water-filled container (max of 5 bass/bag). Black bass should not be kept in the container longer than 5 minutes prior to or after weigh-in without aeration or water exchange;
4) holding tanks following weigh-ins should conform to the following guidelines: a) each tank has a minimum of 100 gallons of water; b) each tank is supplied an aeration or air injector system; c) each tank receives uniodized salt (rock salt or artificial sea salt) at a rate of 0.7 oz/gallon; d) each holding tank has a water temperature maintained at an ambient water body temperature, which must be determined at a depth of 3 feet within the water body on the day of the tournament; and e) the number of bass confined to each tank shall not exceed a pound of bass per gallon of water.

To date, there are no seasonal restrictions of tournaments in the State of Florida. Despite the history of tournaments during mid-summer in Maryland, a tournament-related fish kill of the magnitude described in *Background* has not been recorded by MDDNR or reported by the local public.

Such high-fatality kills have been reported in Florida (pers. comm. Marty Hale, Florida Freshwater Commission) and Oklahoma (Gene Gilliland, Central Region Fishery Supervisor for Oklahoma Department of Wildlife Conservation); these have been attributed to releasing fish in the wrong location and overloading release boats, respectively. Several researchers have also noted that large differences in water temperature of a release boat and water temperature of the water body to which fish are released could compound physiological stress and result in mortality (pers. comm. H. Schraam, USGS, Mississippi Cooperative Fish and Wildlife Research Unit; P. Bettoli, Tennessee Tech University).

Proposed Management

To help protect the populations of largemouth bass in the Chesapeake Bay watershed, we propose the following changes to the State of Maryland's policies related to tournament fishing:

Immediate Actions

1) Fisheries Service will register all large tidal water bass tournaments (*see* Appendix);
    a. registration provides Maryland important information on use of the resource;
    b. registration provides Maryland an opportunity to contact tournament directors and discuss their procedures and gain valuable data on size and catch;
    c. registration provides the tournament directors an opportunity to obtain contact information and gain valuable statistics that may otherwise be unknown (see below);
2) Fisheries Service will require that water temperature within the release boats' live wells should be within 5° F of the water temperature measured at an approximate depth of 3 feet in the water body to which fish will be released. These temperatures are 75°F ± 10° F, depending on month (May – September)
    a. icing live wells can significantly drop water temperatures and cause immediate stress to the fish;
    b. warmer live wells may require better aeration because oxygen is not as well dissolved in warm water as it is in cold water;
    c. keeping fish in the condition of their home habitat water is usually the best way to keep the fish alive;
3) Fisheries Service will require that the minimum capacity of live wells for release boats will be 100 gallons of water;
    a. smaller tanks than 100 gallons may perilously increase the time of the tournament because of more frequent releases of fish to the waterbody;
    b. when release boats are not used, bass should immediately be transferred to the water body (possibly by chutes that are commonly used);
4) Fisheries Service will require that the density of live wells shall be 1 pound of bass per gallon of water;
    a. for a 100 gallon tank, we recommend no more than 50 – 75 fish be maintained within that tank;
    b. high densities of fish can result in oxygen depletion, greater stress because of competition for space, and injuries or harassment;
5) Fisheries Service will require that fish are to be kept within well-aerated containers of water (near or above 100% oxygen saturation) prior to and following the weigh-in.

Maryland Department of Natural Resources personnel will be present at all large tournaments (> 100 boats) to assure adherence to these policies, to assist tournament directors in matters relating to fish health, and to perform the following services:

1) tally poundage of fish for each well kept aboard the release boats;
2) measure oxygen within the live wells of the release boats;
3) measure water temperature of the water body and within the release boat;
4) use tournament activity reports to give tournament directors a summary and report of catch, angling participation, and initial and delayed mortalities;
5) collect tournament-related mortalities for aging fish, learning diet habits, tallying hooking mortalities, and assessing overall health of the fish;
6) assist in the design or optimization of the weigh-in procedure with regional and national tournament chapters.

Future Actions

1) Fisheries Service may mandate that tournament directors register all tournaments with the State of Maryland;
   a. registration provides Maryland important information on use of the resource;
   b. registration provides Maryland an opportunity to contact tournament directors and discuss their procedures and gain valuable data on size and catch;
   c. registration provides the tournament directors an opportunity to obtain contact information and gain valuable statistics that may otherwise be unknown (see below);

2) Fisheries Service may mandate that live wells must be operational, aerated (near or over 100% oxygen), and at a temperature similar to water body water temperatures (within 5° F);
   a. hyperoxygenation, or the supersaturation of oxygen into live wells, enables fish that have relatively high respiration rates and oxygen debts, an opportunity to meet their demand of oxygen in order to recover from exercise;

3) Fisheries Service will recommend that tournament organizers should work with Maryland Department of Natural Resources to ensure thoughtful minimization of steps needed to move fish from the live well of the bass boat to the weigh-in station and then to the site of release. We may mandate steps which are identified as key to a safe and efficient process;
   a. optimize the process to speed up the weigh-in, which is good for the tournament;
   b. limit steps between the angler and release boat, which is key for keeping fish alive;

4) Fisheries Service recommends that handling and culling activities of fish should be minimized;
   a. handling or culling of the fish wipes away important skin mucus that protects the fish from bacterial infections;
   b. handling or culling of the fish increases the fishs' stress level, respiration rate, and heart rate;
   c. last minute catching of a fish could severely impair a fish because that individual needs about 4 hours to recover from exercise in hyperoxygenated water (take special care with these individuals);

5) Fisheries Service recommends that anglers should minimize the amount of time needed to expose the fish to air;

   a. water weigh-ins are good ways of weighing the fish, and these should be televised or photographed more often so that the public can see other ways of handling the fish during the weigh-in;
   b. bass should not be kept in water bags without aeration for longer than 5 minutes;
   c. water bags should hold sufficient water such that all fish are immersed in water;

6) Fisheries Service recommends that the number of fish held in a live well should be from 1 – 3, when possible;
   a. high densities of fish increase respiration rates of fish, thereby reducing available oxygen in the water;
   b. if more than 3 fish are kept in a live well, be sure to ensure super aeration of the live well (overusing ice is not recommended);
   c. splitting fish into two live wells is the best thing to do because it lowers the density of fish in each live well;
7) Fisheries Service recommends that anglers should inform tournament directors that they have knowingly caught a bass and left the hook in the esophagus or gut of the fish;
   a. while the fish may survive the tournament, and not accrue penalty points, the fish will die following the tournament;
   b. in order to help sustain that fish, Maryland Department of Natural Resources staff may be able to remove the hook and treat the wounds that are likely to develop because of hook removal;
8) Fisheries Service recommends that anglers should minimize, wherever possible, the amount of time needed to keep the fish in the water bags;
   a. oxygen is depleted rapidly in the water bag;
   b. fish can suffer injuries from spines of other fish in the bag or harassment.

Malicious negligence of these polices may result in the tournaments' registration with the State of Maryland to be revoked for 1 year and until such time that the tournament director demonstrates a compliance with the recommendations.

Fisheries Service is continuing to assess the effects of tournament angling on populations within the Chesapeake Bay watershed. In addition to assessing survivorship of tournament-caught fish under different experimental scenarios, we also will be visiting tournament sites to estimate delayed mortality. Estimates of fishing mortality will be used during annual population assessments. Tournament angling data are also used to compliment on-going data collection on life history and size structure of black bass by the Fisheries Service. This document will be updated and new policies may be proposed as better information and data become available.

Literature Cited

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APPENDIX 1

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Robert L. Ehrlich, Jr., *Governor*
Michael S. Steele, *Lt. Governor*
C. Ronald Franks, *Secretary*

MARYLAND FISH TRANSPORT PERMIT

Permit Number: _____ Permit Expiration Date: _____

This permit authorizes a person to transport a number or live fish in excess of the legal creel or size limits in Maryland and in Maryland waters for the sole purpose of returning these fish to the waters of Maryland. This waiver is issued under authority provided by Natural Resource Article # 4 - 205 of the Annotated Code of Maryland .

Name and Address of Permittee:

_____

_____

_____

Phone Number or E-mail Address: _____

Name or Chapter of Fishing Tournament: _____

Name of Fish Transporter (if different from Permittee): _____

Phone Number or E-mail Address of Fish Transporter: _____

Dates of Transport _____ Species to be Transported _____

Type of Transport (1) Land Vehicle License Number _____

(2) Boat License Number _____

Capacity of Transport Tank _____ Number of Transport Tanks _____

River of Fish Origin _____

Fish Destination _____

Restrictions:

1) density of fish in live wells shall be 1 pound of bass per gallon of water;
2) water temperature within the release boats' live wells should be within 5° F of the water temperature measured at an approximate depth of 3 feet in the water body to which fish will be released. These temperatures are 75°F ± 10° F, depending on month (May – September);
3) fish are to be kept within well-aerated containers (near or above 100% saturated oxygen) of water prior to and following the weigh-in;
4) minimum capacity of live wells for release boats will be 100 gallons of water;
5) the tournament director must submit a tournament activity report within 30 days of the tournament (attached, or at http://dnrweb.dnr.state.md.us/fish/bass/basstournament.asp).

Assistance:

To assist tournament directors with these restrictions, Maryland Department of Natural Resources can offer the following services to tournaments:

7) be present during large tournaments (> 100 boats) and help complete the **Release Boat Conditions** section of the TOURNAMENT ACTIVITY REPORT by: a) tallying poundage of fish for each well kept aboard the release boats; b) measuring oxygen within the live wells of the release boats; and c) water temperature of the water body and within the release boat;
8) use tournament activity reports to give tournament directors a summary and report of catch, angling participation, and initial and delayed mortalities;
9) collect tournament-related mortalities for aging fish, learning diet habits, tallying hooking mortalities, and assessing overall health of the fish;
10) assist in the design or optimization of the weigh-in procedure with regional and national tournament chapters;

Will Assistance be Desired? ☐ Yes ☐ No

If so, please identify the type of assistance desired by circling the appropriate numbers above.

Additional Recommendations (for release boat captains and all participating anglers):

To help protect our fishery, we have outlined some additional recommendations based on published studies and our own experiences:

1) release different transport tank batches of fish at different locations within a stream in order to spread fish out across as large of an area as practically possible;
2) minimize culling and handling of fish (late caught fish will be the most stressed and deserve the greatest care);
3) fish should not be held in air for longer than is necessary;
3) split fish between boat live wells to lower density of fish in each;
4) live wells should be operational, aerated (at or above 100% oxygen) and at a temperature similar to water body water temperature at 3 feet depth;
5) use only as much ice as needed to cool live wells to appropriate temperature, or when necessary.

I understand that transportation of fish beyond the creel limit of 5/person will result in a breach of law without possession of this permit. Only the person designated as *Fish Transporter* may be in possession of a number of black bass beyond the designated creel limit. Failure to adhere to **Restrictions** of this permit may result in a minimum of a 1-year suspension of the *Permittee* and/or *Tournament Chapter* from receiving another such permit from Maryland Department of Natural Resources.

_____ _____
Permittee Signature Date

Approved _____ _____
Regional Manager/Tidal Bass Manager Date

MARYLAND TOURNAMENT ACTIVITY REPORT

Permit Number: _____

TOURNAMENT CONDITIONS (Completed by:_____)

Chapter:_____ Date of tournament:_____

Body of water:_____

Type of tournament: _____Club _____ Open _____ Boater _____ Non-boater

_____ Catch & release _____ Immediate release ____Harvest permitted

Creel Limit: _____ 3 Fish _____ 5 Fish

Tournament check-in location: _____ Total hours: _____

Number of anglers participating: _____ Total number of fish caught:_____

Minimum length requirement (in):_____ Total weight of fish caught: _____

Winning weight: _____ Weight largest fish: _____

General fishing conditions: _____good _____fair _____poor

Comments:_____

RELEASE BOAT CONDITIONS (Completed by:_____)

Capacity of Transport Tank: _____

Pounds Per Live Tank (one blank/transport tank): _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

Temperature Range of Live Wells: _____ MIN _____ MAX

Oxygen Range of Live Wells: _____ MIN _____ MAX

Water Body Temperature (at 3 feet depth): _____

Were fish dead in the live wells? _____ YES _____ NO How many? _____